Wyoming Density and Disturbance Calculation Tool (DDCT)Web Application

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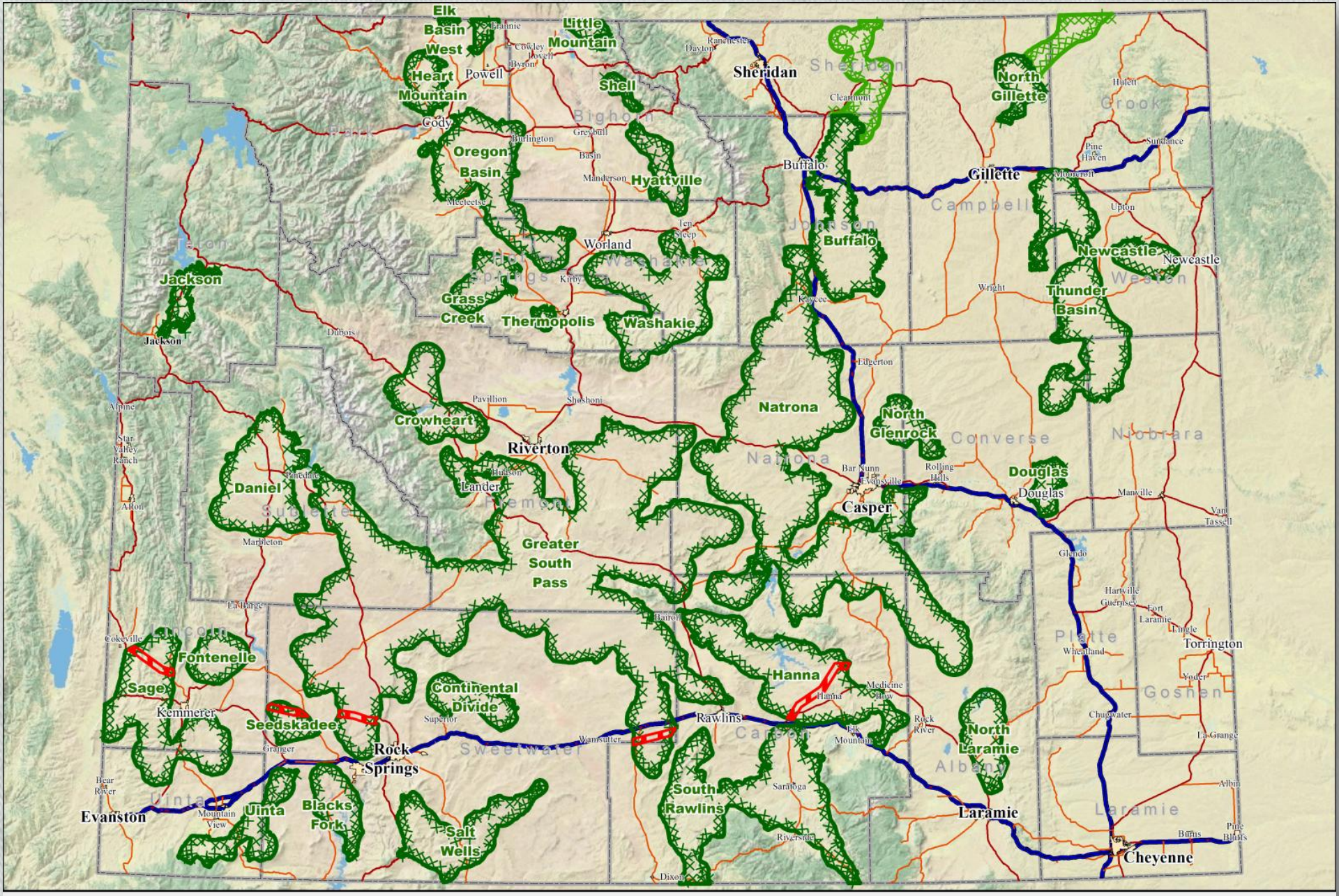
What is a "Core Area Strategy"?

- Establish core population areas
- Limit development to defined thresholds
  - Establish thresholds for affected areas
    - 5% Disturbance averaged
    - Averaged 1 disruption per 640 acres
- Determine affected area and evaluate for thresholds
  - 4 mile buffer from proposed project perimeter
  - Subsequent 4 mile buffer around occupied core area leks within initial 4 mile buffer
  - Clip to core area



Data Sources: US Census Bureau, US Bureau of Land Management, Wyoming Game and Fish Department, Wyoming Office of the Governor, Copyright:© 2011 National Geographic Society, i-cubed

Use of GIS:

June 2010

- Project Impact Analysis Area (PIAA)
- ArcGIS 9.3 Model (BLM)

June 2011

- Desktop DDCT
- ArcGIS 10 Python Script (WyGISC)

July 2012

- Web DDCT
- Creation of a DDCT Data and Application Steward position

Challenges of Desktop GIS Implementation

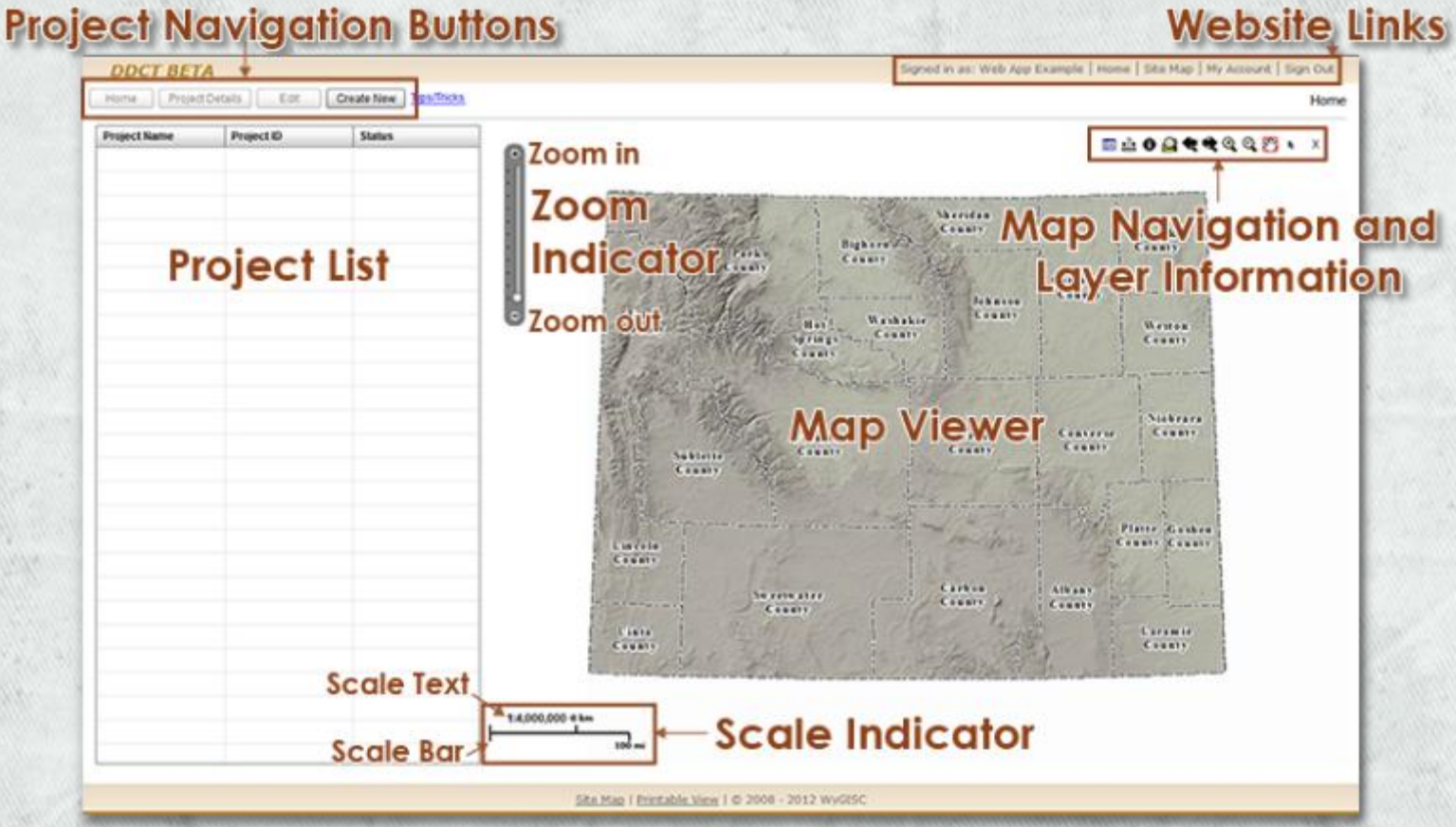
- Core Areas cover 25% of the state (25,000 sq. Miles or 63,300 sq. km)
- Every project in a core area is required to run a DDCT
- Complicated analysis
  - Boundary
  - Disturbance
  - Disruption
- No statewide disturbance layer
- No centralized QA/QC
- Each project is done individually

Desktop GIS Technology Challenges

- Desktop Model Requires ArcInfo License Level
  - High Learning Curve
  - High Cost
- Each User Creates Their Own Disturbance
  - Not Shared
  - No Centralized QA/QC

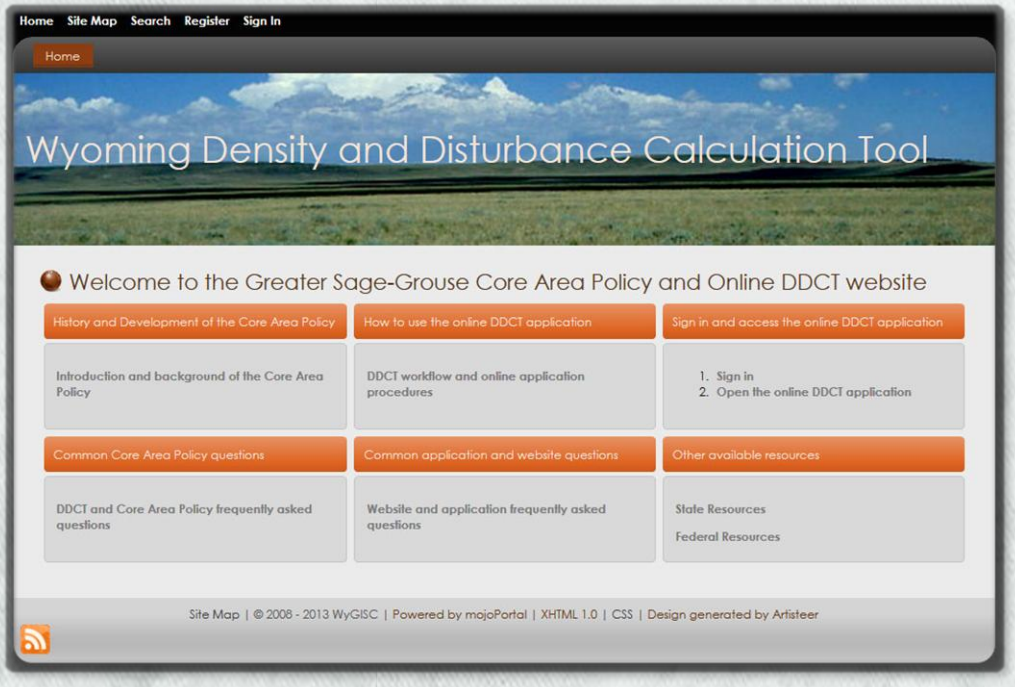
Streamlining the DDCT process

- Create an online DDCT web application
- Create a DDCT Data and Application Steward position



Advantages of a Web Based Application

- Centralized Location and QA/QC
- Free / Reduced Cost
- Reduced Data Requirements / Common Base Data
- Statewide Disturbance and Disruption Layer
- Wider User Base



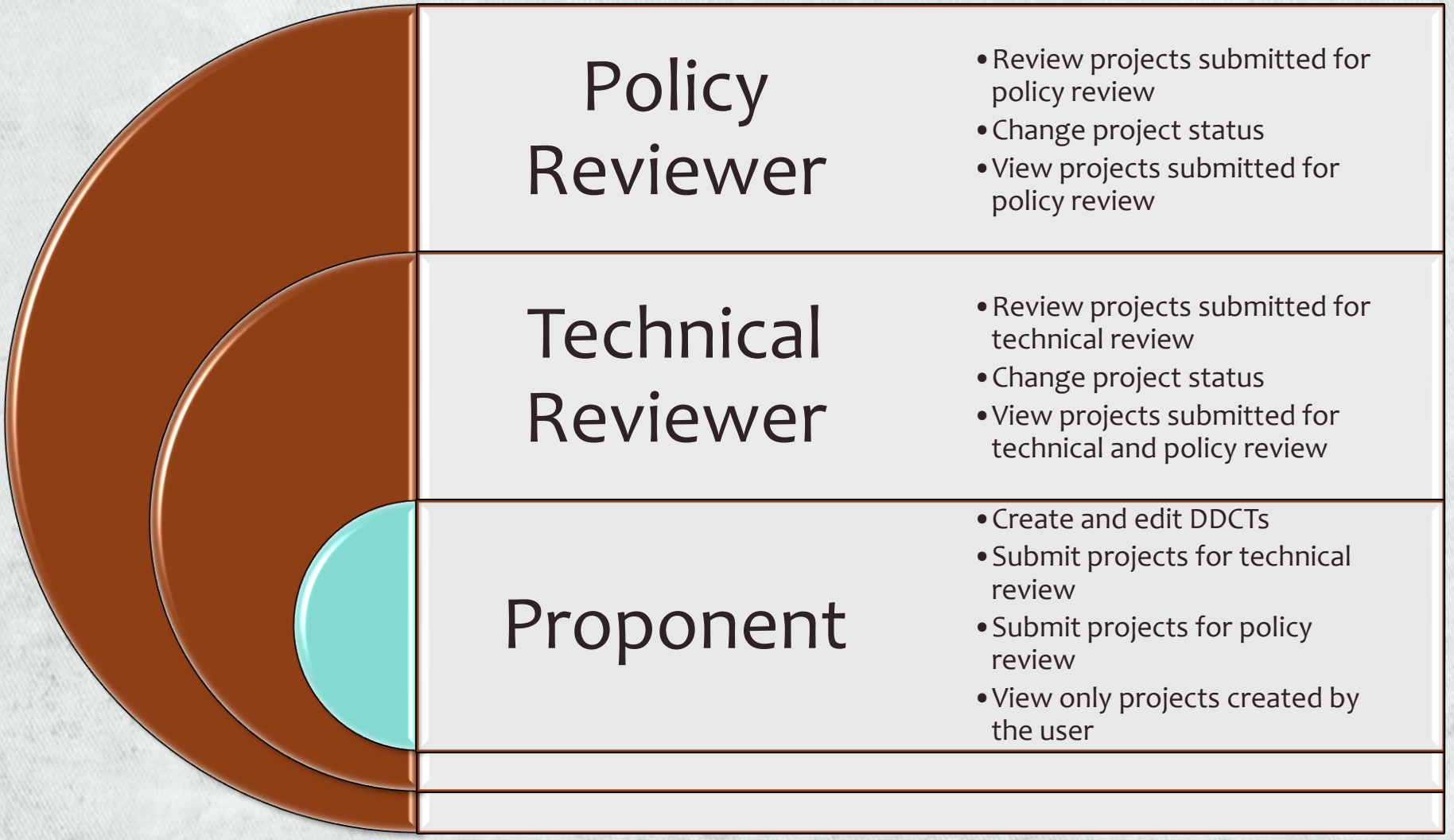
Web Application Host

- Wyoming Geographic Information Science Center (WyGISC)
  - Research institute at the University of Wyoming
  - Maintained the de facto state geospatial data clearinghouse
  - Long history of creating and implementing place-based decision support tools
  - WyGISC's state agency partnership with WGFD exemplifies UW's land grant mission

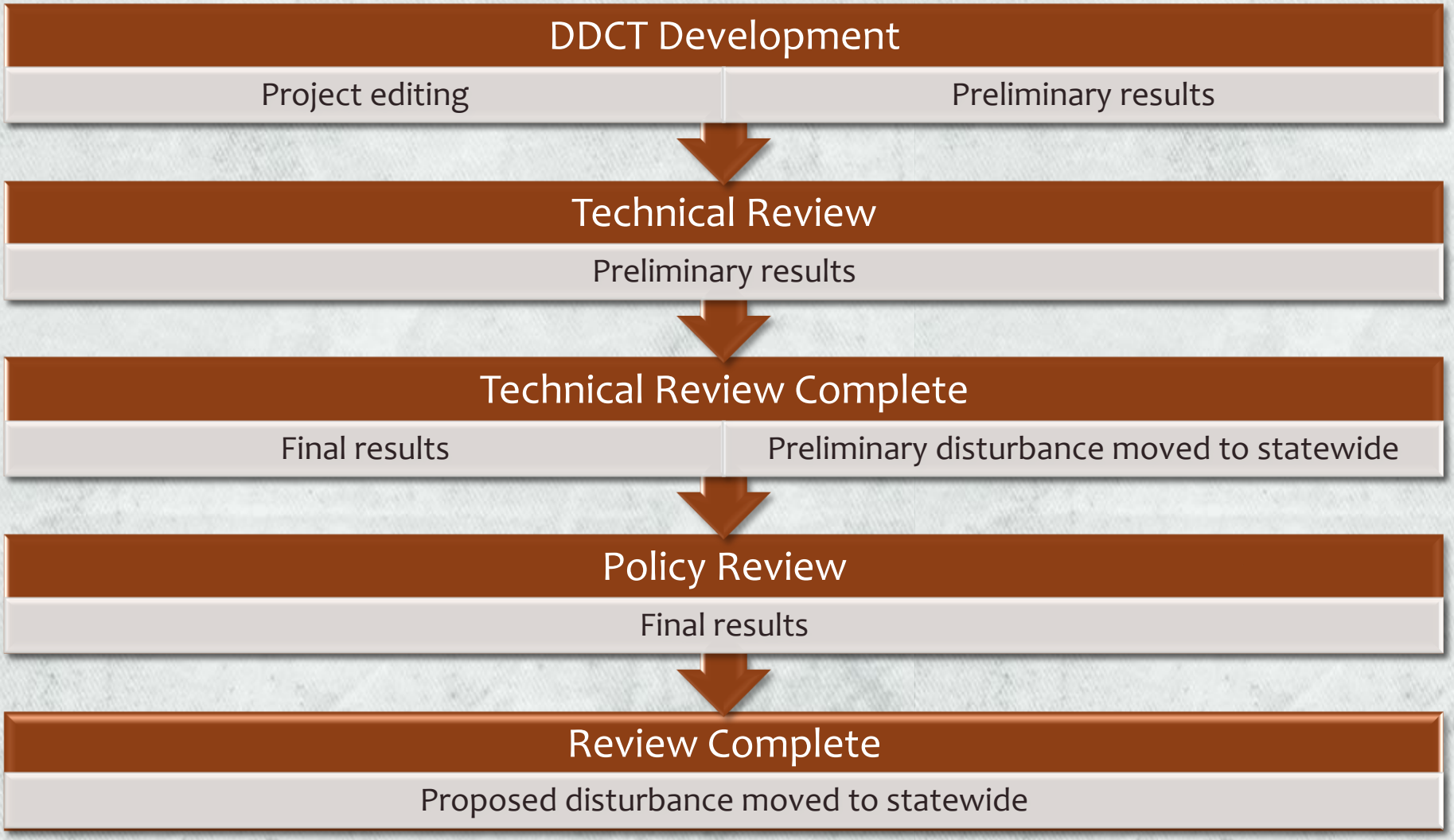
System Architecture

- Website
  - Hosted by the University of Wyoming
  - Free Content Management System
  - User Registration and Login
- Web Application
  - Built with Adobe Flash Builder 4.5
    - Using ArcGIS API for Flex 2.5
  - Running on ArcGIS Server 10.1
- Database
  - SQL Server relational database
  - Backed up every 4 hours

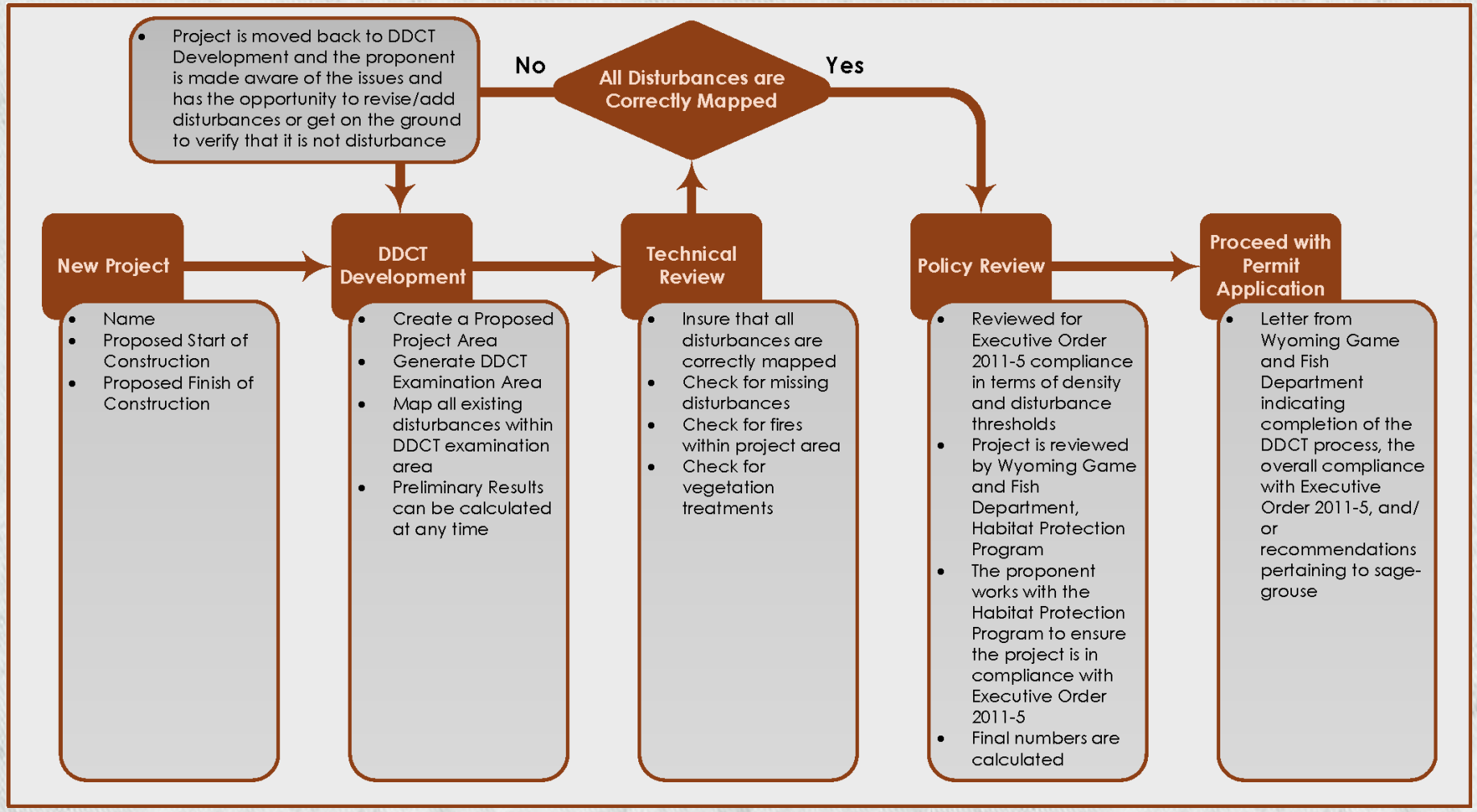
User Roles


Policy Reviewer
• Review projects submitted for policy review
• Change project status
• View projects submitted for policy review
Technical Reviewer
• Review projects submitted for technical review
• Change project status
• View projects submitted for technical and policy review
Proponent
• Create and edit DDCTs
• Submit projects for technical review
• Submit projects for policy review
• View only projects created by the user

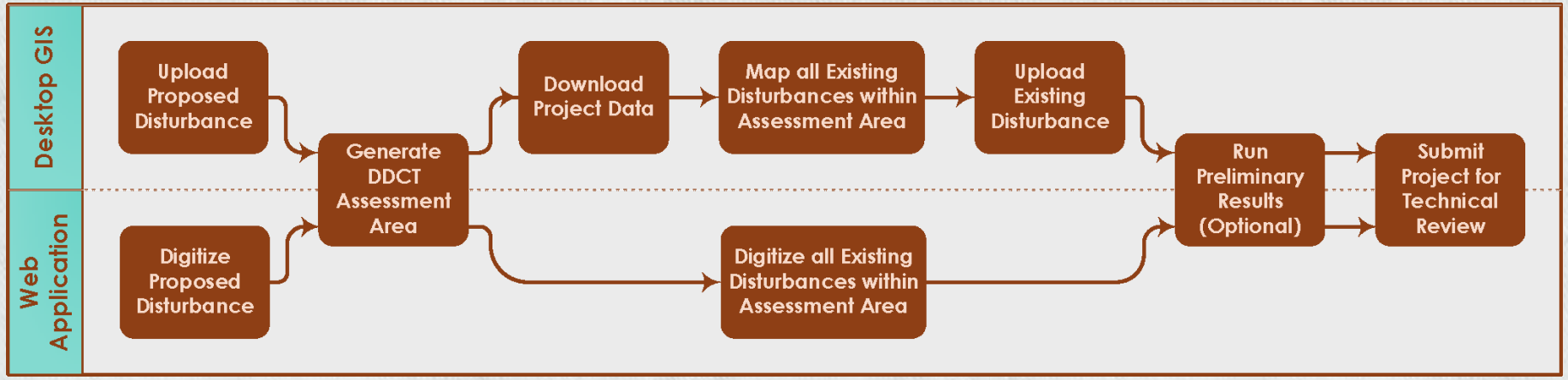
Project Status:



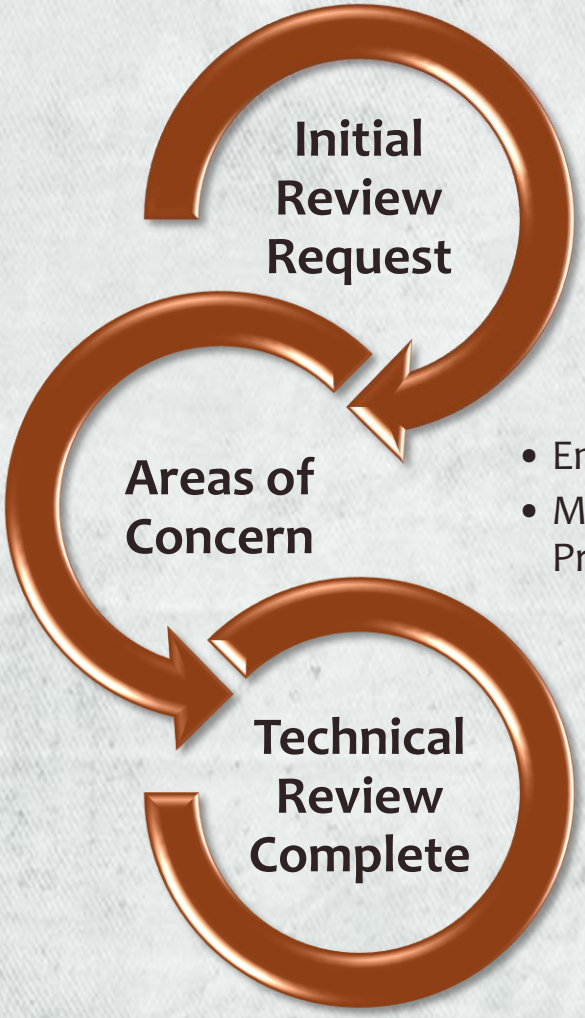
Permitting Workflow



DDCT Development Workflow



Communication
Between Project Proponent and DDCT Steward



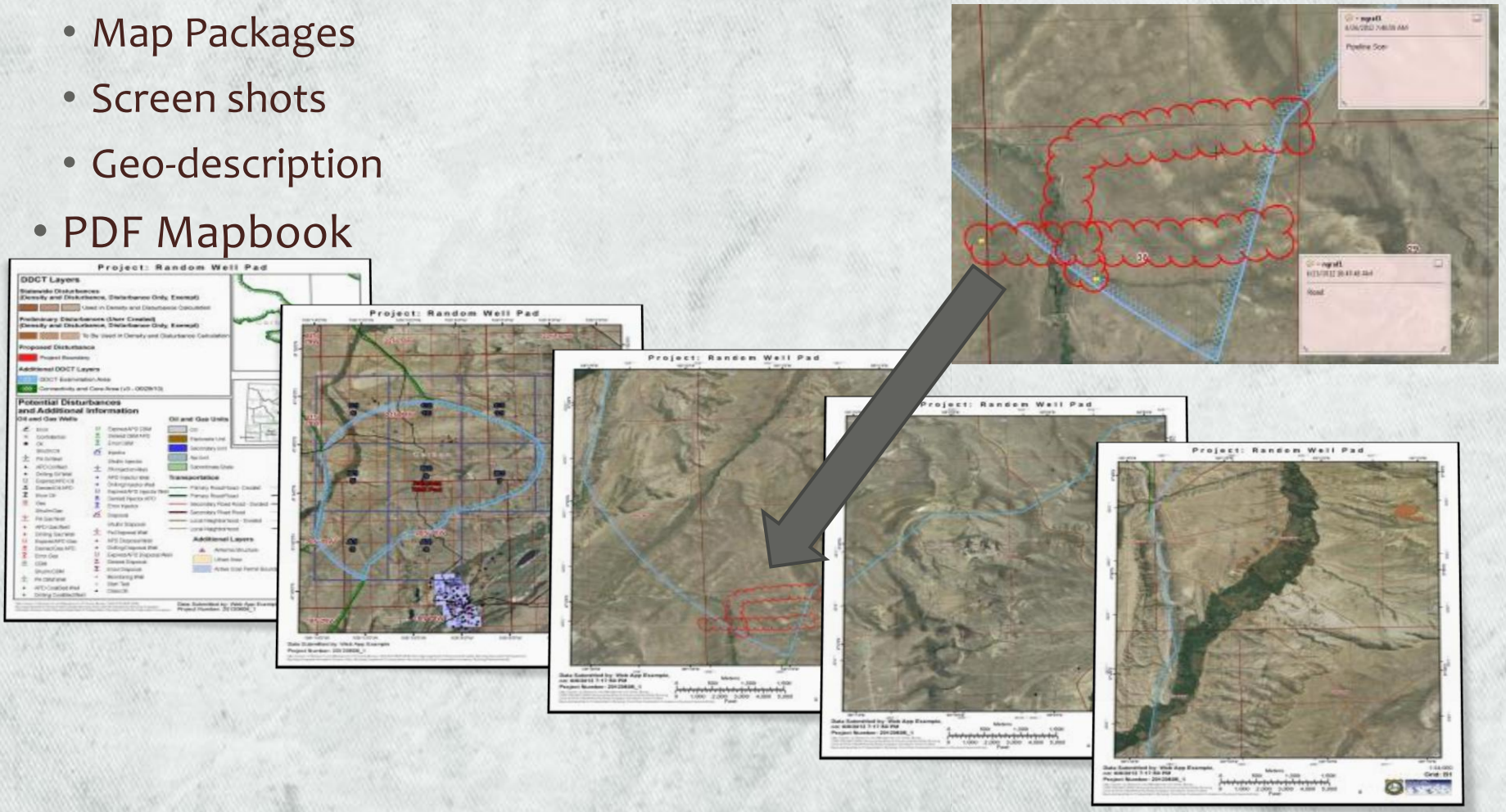
- Email sent to DDCT Steward
- DDCT Steward notifies Proponent: Project has been received
  - Proponent starts worksheet
- HPP assigns Review Number

- Email sent to Proponent: set up cloud sharing account
- Mapbook with comments on cloud drive, shared with Proponent

- Email sent to Proponent that review is complete
  - Final Mapbook is moved to cloud drive
- Proponent emails material for Policy Review
  - Worksheet
  - Final Results
- HPP is notified that the project is ready

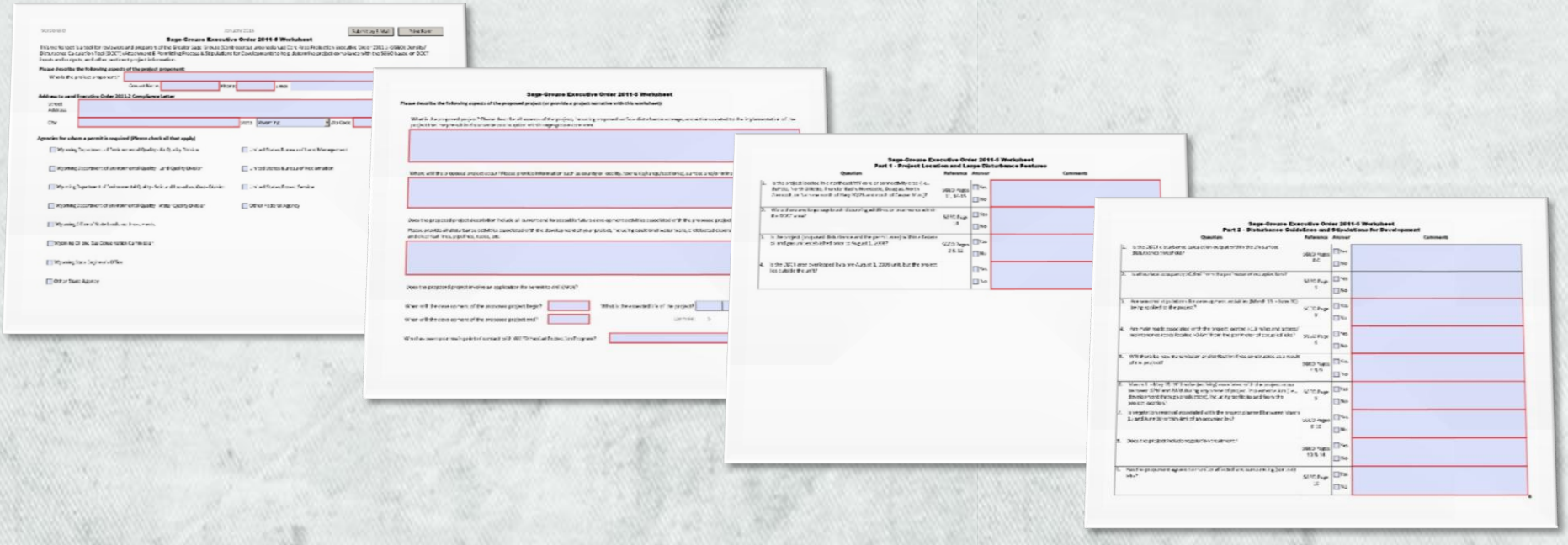
Communicating Areas of Concern

- How to communicate corrections disagreements
  - Map Packages
  - Screen shots
  - Geo-description
- PDF Mapbook



Communicating Additional Project Information

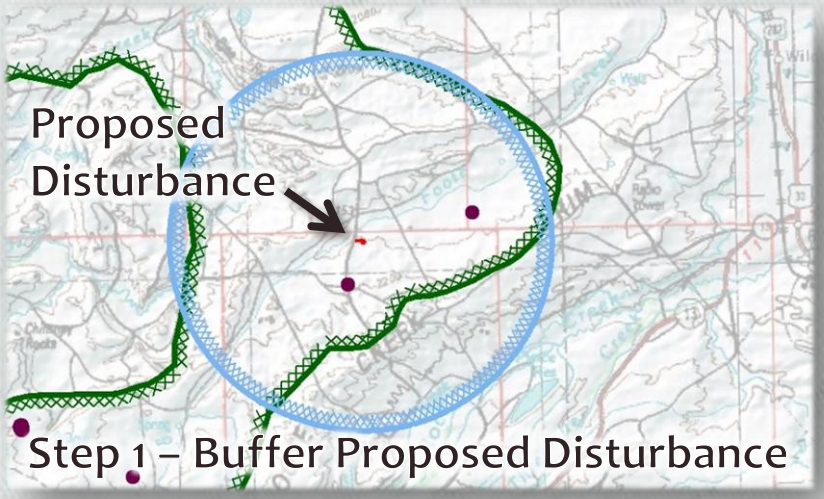
- Worksheet
  - Project Location and Large Disturbance Features
  - Disturbance Guidelines and Stipulations for Development
  - Density Guidelines and Specific Stipulations
  - Deviations and Mitigation



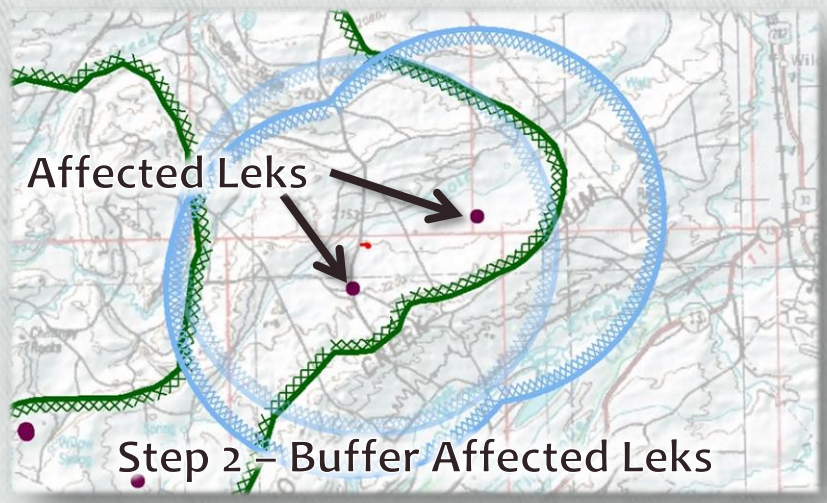
Tools and Services

- Web Service Tools
  - Boundary (Assessment Area)
  - Preliminary Analysis
  - Final Analysis
- Desktop Tools
  - Get Project Location Information
  - Generate Mapbook
  - Get Project Data
  - Nightly Maintenance

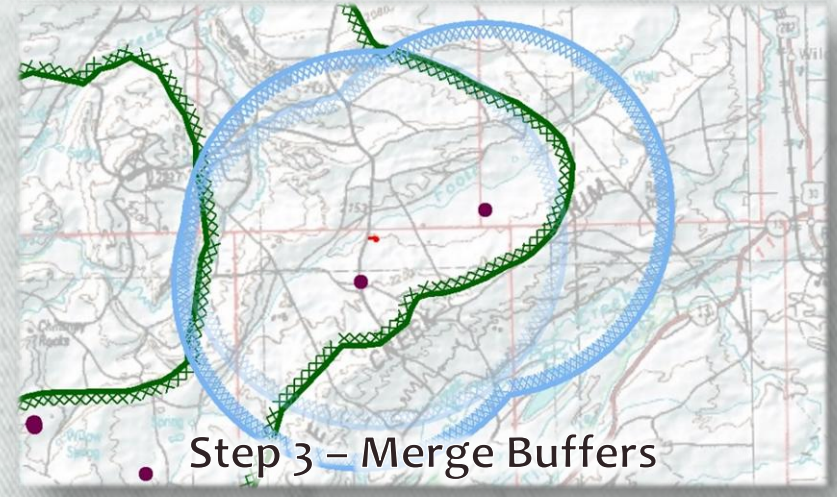
Create the Assessment Area



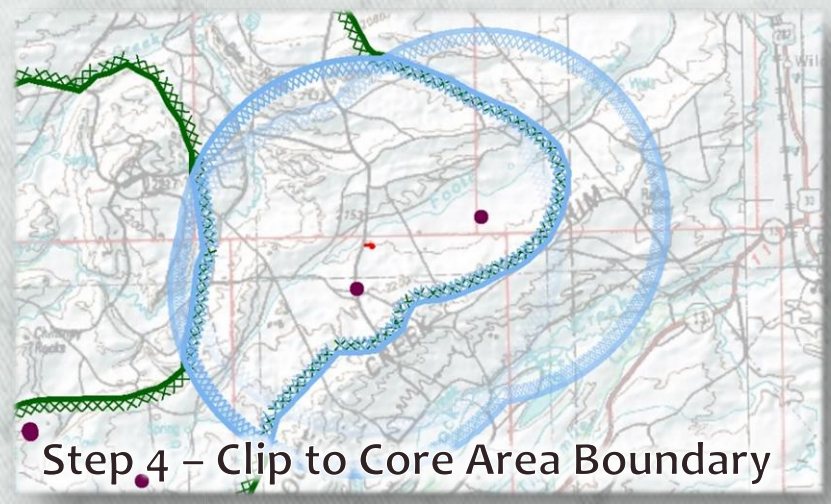
Step 1 – Buffer Proposed Disturbance



Step 2 – Buffer Affected Leks

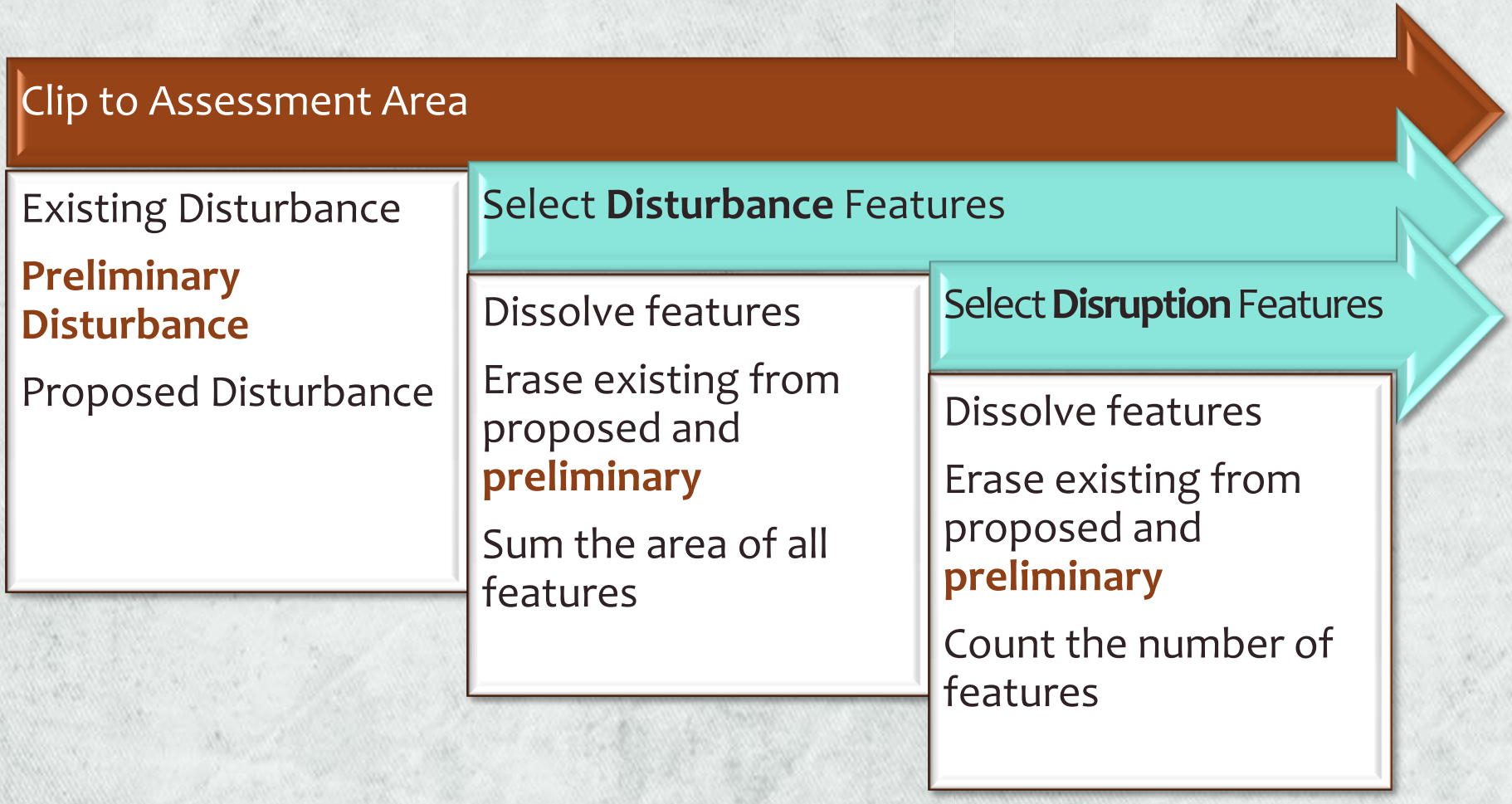


Step 3 – Merge Buffers

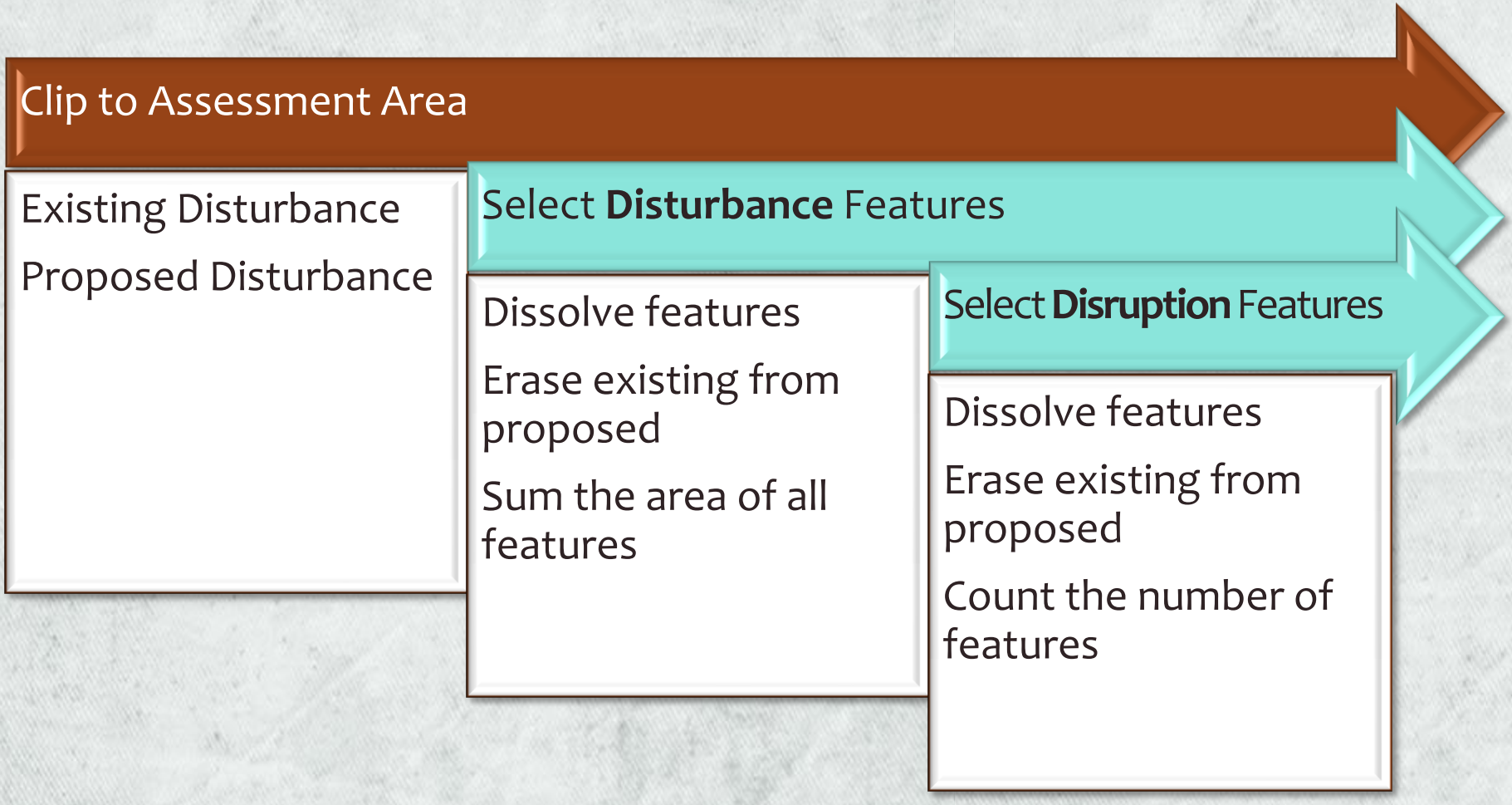


Step 4 – Clip to Core Area Boundary

Preliminary Results



Final Results



Desktop Tools

- Get Project Location Information
  - Surface Ownership
  - Mineral Rights
  - Regional Information
- Generate Mapbook
- Get Project Data
- Nightly Maintenance
  - Move data to statewide layer
  - Cleanup database

Layers Used in the Application

- Layers edited by users
- Layers creating by the application
- Layers edited by the Data and Application Steward
- Layers used in web service tools

Layers Edited by Users

- Project Table
  - Project Identifier*
  - Name of project
  - Project Ownership Information
  - Description
  - Dates
  - HPP Project Identifier+
- Proposed Disturbance
  - Project Identifier*
  - Disturbance identifier
  - Disruption Identifier
  - Comments
  - Location and Area
- Preliminary Disturbance
  - Project Identifier*
  - Disturbance identifier
  - Disruption Identifier
  - Comments
  - Location and Area

*Created by Application

+Added by DDCT Steward

Layers Created by Application

- Boundary
  - Project Identifier
- Map Grids
  - Project Identifier
  - Grid Name
- Statistical Outputs
  - Disturbance Statistics
  - Lek Disturbance Statistics
  - Ownership Statistics

Layers Edited by the Data and Application Steward

- Statewide Existing Disturbance
  - Project Identifier
  - Disturbance identifier
  - Disruption Identifier
  - Comments
  - User information
  - Location and Area

Layers Used in Web Service Tools

- Boundary (Assessment Area)
  - Input:
    - Proposed Disturbance
  - Outputs:
    - Boundary
    - Map Grids
- Preliminary Analysis
  - Inputs:
    - Proposed Disturbance
    - Preliminary disturbance
    - Existing Disturbance
  - Outputs
    - Disturbance Statistics
- Final Analysis
  - Inputs:
    - Proposed Disturbance
    - Existing Disturbance
  - Outputs
    - Disturbance Statistics
- Background Layers (All Tools)
  - Occupied Leks
  - Core Areas

Building the Statewide Disturbance Layer

- Start with known vector data source
  - Roads and Transportation Networks
  - Oil and Gas Wells*
  - Oil and Gas Unit Boundaries
  - Mining
  - Cropland*
  - Structures
  - Vegetation Treatments*
  - Pipelines*
- Add data from each new project

*Data is not accurate enough to add directly

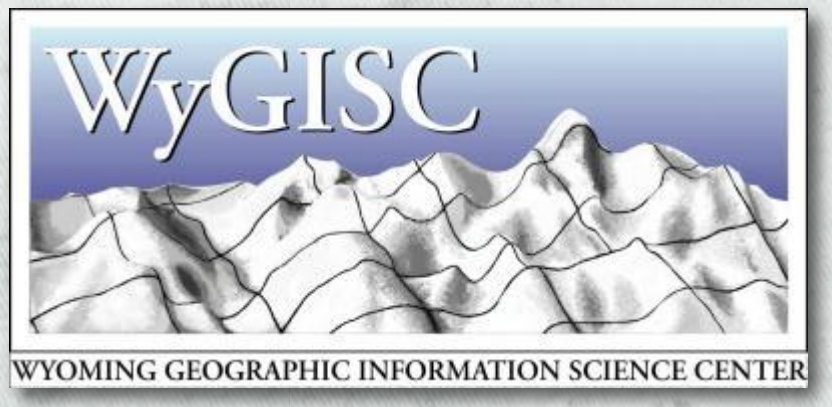
Usage (Aug 2012 – Aug 2013)

- Website Users
  - 127 New Users
  - 1,578 Unique visitors viewed the DDCT website 5,422 times
    - Visitors from 5 countries
    - Visitors from 35 states
- Web Application Projects
  - 256 Projects created
    - 122 are Complete
    - 81 in Development
    - 27 are in Technical Review
    - 12 are Technical Review Complete
    - 14 in Policy Review

Review Timeline

- Initial review
  - New area
    - 2 to 10 hours
  - Partially covered area
    - 1 to 5 hours
  - Previously reviewed area
    - About an hour

Wyoming Density and Disturbance Calculation Tool

Thank you.
Questions?

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